

Lathrop, San Joaquin county: all land west of the San Joaquin river within one-half mile of the river bank was under water on the 14th.

Stockton, San Joaquin county: the Calaveras overflowed on the 9th and inundated the plains northeast of this city, causing considerable damage to crops. A washout occurred on the narrow gauge railroad, one and one-half miles west of Wallace.

San José, Santa Clara county: the heaviest rain of the season fell during the night of the 8-9th. The Guadalupe and Los Gatos creeks overflowed their banks, both above and below this place, submerging a large area of farming land. Trains on the Southern Pacific railroad were delayed for several hours on account of washouts.

Los Angeles: the heavy rains preceding the 8th caused greater damage to the Southern Pacific railroad than the storm of February. The railroad bridge across the Santa Anna river at Colton was washed away. Great damage was also done to the Southern Pacific railroad, north of Los Angeles. The river rose rapidly during the evening of the 9th, overflowing its banks in several places, and causing damage to the extent of several thousand dollars. Numerous buildings were washed away.

San Francisco: on the 10th the Colorado division of the Southern Pacific railroad was badly washed, west of Daggett, for a distance of six miles. The breaking of a levee at Robert's Island, near Stockton, San Joaquin county, on the night of the 18-19th, destroyed about 27,000 acres of growing wheat, entailing a loss of \$500,000.

Connecticut.—New Haven: on the 26th a massive dam at Beaver lake, eleven miles northwest of this city, gave way, resulting in the destruction of three large manufacturing establishments. The losses sustained are estimated at \$100,000.

Hartford: a high stage of water occurred in the Connecticut river on the 28th, flooding many cellars in the city and overflowing the meadows adjacent to the river.

Dakota.—Bismarck: the lowlands on both sides of the river were flooded on the 28th.

Illinois.—Rockford, Winnebago county: a portion of a mill at New Milford was swept away by high water on the 19th.

Iowa.—Cedar Rapids, Linn county: on the 26th the Cedar river reached the highest point known since 1858. Considerable damage was caused by the flooding of cellars, &c.

Louisiana.—Shreveport, 4th: on many of the plantations which were recently overflowed, ploughing and other farm work was begun.

Maine.—Bangor: the bridge near Hampden, Penobscot county, was swept away during the night of the 28th-29th.

Massachusetts.—Worcester, Worcester county: a new reservoir dam at Spencer, in this county, constructed at a cost of \$10,000, gave way on the 27th.

Lawrence, Essex county: the high-water in the Merrimac river, on the 28th, flooded the cellars in this city and caused suspension of work in the mills.

Michigan.—Port Huron: a freshet occurred in Black river on the 23d. Several boats and rafts of logs were broken from their moorings, and the bridge at this place was carried away.

Mississippi.—Yazoo City: on the 16th, all the lowlands in this vicinity were inundated.

New Hampshire.—Manchester, Hillsborough county: on the 28th the Merrimac river was higher than it had been since October, 1869.

Nashua, Hillsborough county: on the 28th, both the Merrimac and Nashua rivers were higher than they have been for the last four years. The backwater from the Nashua river overflowed cellars and lowlands.

Concord, Merrimac county: the Merrimac river was higher on the 28th than has been known for many years. The low lands in this vicinity were completely inundated.

Henniker, Merrimac county: the water in the Contoocook river was higher on the 28th than it has been for several years.

New York.—Utica: the water in Oriskany creek rose rapidly on the 12th, flooding the village of Oriskany and sweeping away outbuildings and fences. Cellars were filled to overflowing, and in many cases the water covered the lower floors of the houses. On the same day the Mohawk river overflowed, covering the New York Central railroad track to a depth of from two to three feet and causing delay of trains. By midnight of the 12-13th the water had subsided sufficiently to permit trains to pass over the road.

Buffalo: the heavy precipitation accompanying the storm of the 12th flooded the southeastern part of the city, the water reaching a greater height than has been known for ten years.

Pennsylvania.—Pittsburg: the Alleghany river reached a height of nineteen feet ten inches on the 13th, submerging the tracks of the Pittsburg and Western railroad between Sharpsburg and Alleghany City.

Rhode Island.—Providence: the dam of the Newport waterworks broke during the night of the 25-26th.

Tennessee.—Chattanooga: at 11.30 p. m. of the 7th, the river gauge showed a rise of thirteen feet and eleven inches during the preceding twenty-four hours, and on the 8th it reached the danger line. On the 9th the lower portions of the city were flooded. The river continued to rise on the 10th and 11th, reaching its maximum height, forty-three feet, on the latter date. This stage of water has been exceeded but twice in former years, viz.: fifty-eight feet, March 11th, 1867, and fifty-three feet, eleven inches, March 1st, 1875. Owing to the timely warning of the approaching flood, the damage was comparatively small.

Nashville: the Cumberland river, on the 14th, was several inches higher than at any time during the winter, and many families in the low lands were driven from their homes. Numerous small dwellings in the northern part of the city were inundated. Nearly all of the mills along the river were compelled to suspend operations on account of the high stage of water.

Utah.—Salt Lake City: at North Fork the Central Pacific trains were delayed for two days previous to the 7th, owing to an overflow of the Humboldt river. The water in Bear river was higher than has been known since 1873. The river rose seven feet in twenty-four hours, washing out all the bridges. Two bridges on the Waldo river were also washed away.

Virginia.—Petersburg: the heavy rain on the night of the 25-26th caused the water in the Appomattox river to reach a very high stage. The meadows adjacent to the river were flooded.

Lynchburg, 26th: the recent heavy rains in this part of the state caused an overflow in the James river. A portion of the Richmond and Alleghany railroad track was submerged, and several mill-dams were damaged.

Richmond: owing to the high stage of water in the James river on the 27th, navigation was temporarily suspended. All of the wharves in the lower part of the city were submerged.

HIGH TIDES.

New River Inlet, North Carolina: 26th, 27th.
Hatteras, North Carolina: 30th.
Cedar Keys, Florida: 12th.
Indianola, Texas: 24th.

LOW TIDES.

New River Inlet, North Carolina: 3d, 8th, 9th, 17th, 18th, 20th.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors during March, 1884, with the average depth at which the observations were made and the mean temperature of the air at the various stations, are given in the table below. The highest water temperature of the month, 82° 2, was reported from Key West, Florida; the lowest, 27° 1, from Delaware Breakwater, Delaware. The following are the largest monthly ranges: 27° 0 at Delaware Breakwater; 25° 7 at Cedar Keys, Florida; 21° 3 at Galveston, Texas; 21° at Augusta, Georgia, and Chinc-

teague, Virginia; 20° 3 at Indianola, Texas, and 20° 1 at Norfolk, Virginia. The smallest monthly ranges are: 1° 3 at Eastport, Maine; 2° 7 at San Francisco, California; 5° 9 at Portland, Oregon; 6° 7 at Portland, Maine; 7° 2 at Sandy Hook, New Jersey, and 8° at New London, Connecticut. Observations were not made on account of ice during the month as follows: Grand Haven, Michigan from 4th to 10th; Cleveland, Ohio, from 1st to 22d, 23d to 26th and 31st; Toledo, Ohio, from 1st to 21st; Sandusky, Ohio, from 1st to 19th; Chicago, Illinois from 1st to 23d:

Temperature of water for March, 1884.

Station.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
Atlantic City, New Jersey.....	48.3	32.0	16.3	ft. 4	in. 5	38.6
Alpena, Michigan*						
Augusta, Georgia.....	66.0	45.0	21.0	17	4	59.5
Baltimore, Maryland.....	48.6	35.8	12.8	9	0	44.0
Block Island, Rhode Island.....	41.5	29.4	12.1	8	3	36.0
Boston, Massachusetts.....	40.8	29.9	10.9	22	2	33.5
Buffalo, New York*						
Canby, Fort, Washington.....	51.0	40.7	10.3	16	6	44.0
Cedar Keys, Florida.....	76.0	50.3	25.7	12	2	66.7
Charleston, South Carolina.....	65.6	52.9	14.7	40	11	59.8
Chicago, Illinois†	42.3	38.3	4.0	8	7	34.2
Chincoteague, Virginia.....	53.5	34.5	21.0	4	9	42.3
Cleveland, Ohio.....	38.1	37.4	0.7	14	0	33.6
Detroit, Michigan*						
Delaware Breakwater, Delaware.....	54.1	27.1	27.0	8	7	40.1
Duluth, Minnesota*						
Eastport, Maine.....	33.3	32.0	1.3	14	9	28.2
Escanaba, Michigan*						
Galveston, Texas.....	71.5	50.3	21.3	12	1	64.8
Grand Haven, Michigan†	44.3	32.1	12.2	19	0	32.0
Indianola, Texas.....	72.8	52.5	20.3	9	5	65.7
Jacksonville, Florida.....	73.0	59.0	14.0	18	0	66.3
Key West, Florida.....	82.2	69.0	13.2	17	7	74.0
Mackinaw City, Michigan*						
Macon, Fort, North Carolina.....	64.5	49.0	15.5	2	10	54.8
Marquette, Michigan*						
Milwaukee, Wisconsin*						
Mobile, Alabama.....	66.0	52.0	14.0	16	1	62.2
New Haven, Connecticut.....	41.6	29.9	11.7	15	3	33.6
New London, Connecticut.....	41.8	33.8	8.0	12	2	35.8
New York City.....	44.0	31.1	12.9	10	2	37.5
Norfolk, Virginia.....	58.5	38.4	20.1	16	7	50.3
Pensacola, Florida.....	68.1	57.9	10.2	17	6	63.1
Portland, Maine.....	36.4	29.7	6.7	16	2	33.7
Portland, Oregon.....	48.6	42.7	5.9	56	4	45.4
Provincetown, Massachusetts.....	41.2	31.5	9.7	10	5	34.6
Sandusky, Ohio.....	44.0	34.3	9.3	10	10	34.9
Sandy Hook, New Jersey.....	41.4	34.2	7.2	1	7	38.0
San Francisco, California.....	55.4	52.7	2.7	39	3	54.0
Savannah, Georgia.....	65.8	48.8	17.0	10	4	61.7
Smithville, North Carolina.....	64.1	49.0	15.1	10	0	56.2
Toledo, Ohio.....	48.5	38.6	9.9	12	6	35.2
Wilmington, North Carolina.....	63.2	47.3	15.9	19	7	58.1

* Frozen entire month. † Frozen part of month: see text.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for March, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 82.67 per cent. The percentages for the four elements are: weather, 87.26; direction of the wind, 76.51; temperature, 80.56; barometer, 87.94 per cent. By geographical districts they are: for New England, 83.60; middle Atlantic states, 83.48; south Atlantic states, 84.36; eastern Gulf states, 81.42; western Gulf states, 79.73; lower lake region, 84.00; upper lake region, 83.68; Ohio valley and Tennessee, 84.15; upper Mississippi valley, 82.96; Missouri valley, 78.94; north Pacific coast region, 72.37; middle Pacific coast region, 88.16; south Pacific coast region, 92.11. There were five omissions to predict, out of 3,448 or 0.15 per cent. Of the 3,443 predictions that have been made, one hundred and eleven, or 3.22 per cent., are considered to have entirely failed; one hundred and forty-four, or 4.18 per cent., were one-fourth verified; four hundred and fifty-one, or 13.10 per cent., were one-half verified; six hundred and eight, or 17.66 per cent., were three-fourths verified; 2,129, or 61.84 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During March, 1884, two hundred and forty-six cautionary signals were ordered. Of these, two hundred, or 81.30 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. Sixty-two cautionary off-shore signals were displayed, of which number, fifty-four, or 87.09 per cent., were fully justified both as to direction and velocity; sixty-one, or 98.38 per cent., were justified as to direction; and fifty-five, or 88.71 per cent., were justified as to velocity. Three "northwest" signals were displayed on the lakes; all of these were justified both as to direction and velocity. Three hundred and eleven signals of all kinds were displayed, two hundred and fifty-seven, or 82.60 per cent., being fully justified. These do not include signals ordered at display stations, where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, sixty were changed from cautionary; the "northwest" signals were also changed from cautionary. In seventy cases, winds of twenty-five miles or more, per hour, were reported for which no signals were ordered.

The verification of railway signals issued during the month by the "Ohio Meteorological Bureau," Professor T. C. Mendenhall, Director, was as follows:

Temperature, 92 per cent.; precipitation, 88 per cent.

The signals above referred to consist of colored symbols displayed from the sides of the baggage cars on various railroads in Ohio, and represent the daily forecasts as telegraphed from the office of the Chief Signal Officer to said bureau.

ATMOSPHERIC ELECTRICITY.

AURORAS.

An auroral display which occurred on the evening of the 28th was observed throughout the northern part of the United States. This was the most extensively observed display of the month, and appears to have been most brilliant from the lake region westward to the Pacific. The display occurring on the evening of the 1st was generally observed in the lake region and New England. On the 25th a display was observed at New River Inlet, North Carolina, which was not reported from any other station. The following reports relate to the display of the 28th:

Provincetown, Massachusetts: auroral display from 10.50 p. m. of the 28th, until midnight, consisting of faint beams reaching nearly to the zenith.

Fall River, Massachusetts: a brilliant auroral display occurred on the 28th, lasting from 8 to 11 p. m. The auroral light extended over about 60° of the northern horizon and beyond the zenith.

New Haven, Connecticut: an auroral arch, extending over about 100° of the northern horizon, was visible in the northern sky at 7.30 p. m. of the 28th. The display was of moderate brilliancy and was obscured by clouds at 10 p. m.

Rochester, New York: aurora from 7.20 to 11 p. m. of the 28th; very bright at 9 p. m., when beams of pale yellow color extended upward 65° from the horizon.

Oswego, New York: aurora at 8.30 p. m. of 28th, consisting of a band of white light which extended from northwest to east. The display reached its maximum brilliancy at 8.55 p. m. and disappeared at 9.30 p. m.

Alpena, Michigan: aurora at 8.15 p. m. of 28th, consisting of a diffuse light with a few pale streamers having an apparent motion from east to west.

Duluth, Minnesota: faint aurora at 9.45 p. m. of the 28th, consisting of flashes of pale green light, at times reaching upward to the zenith.

Escanaba, Michigan: a brilliant auroral display occurred on the 28th. It was first seen at 7.54 p. m. Four minutes later an arch formed near the horizon and gradually moved upward until it reached a point 15° south of the zenith. When the arch reached the zenith, bright, yellow beams, having a swaying motion, shot upward from the northern horizon. The display had entirely faded away at 9.50 p. m.